

LEARNING IN SECONDARY PRESERVICE TEACHER EDUCATION FROM THE COMMUNITIES OF PRACTICE PERSPECTIVE

Pedro Gómez, Luis Rico

Universidad de Granada

On the basis of a study of a group of mathematics preservice teachers working at home developing the tasks for a methods course, we discuss the implications of introducing the communities of practice perspective in mathematics teacher education. We argue that learning as a social practice should be valued in this context and we identify some of the issues involved in designing and implementing teacher training programs based on this conceptual framework.

PRESERVICE TEACHERS' LEARNING IN A METHODS COURSE

Research in teacher education has become increasingly concerned with teachers' development from perspectives rooted in sociocultural views of learning (Lerman, 2001). In particular, Wenger's social theory of learning (Wenger, 1998) and its notion of community of practice are becoming popular as a conceptual framework for exploring the learning processes of teachers working together. However, "while mathematics teacher education researchers are creating contexts that enable teacher learning and describe what teachers learn in social terms, little has been done to explain *how* those contexts enable learning" (Graven & Lerman, 2003, p. 189). As Krainer (2003) has pointed out, there is much to be explored concerning the role of this perspective in teacher education: "What can we learn from 'learning enterprises'? What implication for research in teacher education has an approach that builds on 'community of practice'?" (p. 96).

The study was done within the context of a methods course for last year mathematics students. Preservice teachers were organized in groups. They performed several tasks along the course that involved the analysis of a mathematical topic from a variety of possible different didactical meanings. For each task, each group worked at home and performed a presentation to the class with the help of transparencies. In other studies we have explored the results of the work produced by the groups of preservice teachers (Gómez & Rico, 2004). Those studies analyzed the results of learning processes performed by each of the groups. But what kind of processes were there? Is it possible to describe and characterize some of those processes? In other words, is it possible to explore the emergence of learning that took place in a group?

For this purpose, we had chosen one of the groups of preservice teachers and had asked their members to allow us to record in audio their group interaction while preparing their presentations for the course. This group had the quadratic function as its topic of study. Eight meetings were recorded, producing 18 hours of recording. Following Stein and Brown (1997) we decided that “rather than focusing on the learning processes of individual teachers undergoing transformation, [we could conceptualize] teacher learning as a process of ‘transformation of participation’ in the practices of a community” (p. 155). For that purpose, we decided to ground our study on Wenger’s social theory of learning (Wenger, 1998).

The idea of *community of practice* represents the smallest unit of analysis in which one can include the negotiation of meaning as a mechanism of learning. It is configured on three notions: mutual engagement, joint enterprise and shared repertoire. Learning as a social practice can be characterized by these three notions: *learning in practice implies a mutual engagement in the search of a joint enterprise with a shared repertoire*. That is, learning as a social practice implies:

- ◆ evolving forms of mutual engagement,
- ◆ understanding and tuning the enterprise, and
- ◆ developing the shared repertoire.

We operationalized Wenger’s theory by contextualizing the above three processes to our research problem. We coded the transcriptions, producing 7,412 episode—code pairs corresponding to 2,606 episodes (since several codes could be assigned to a given episode). This coding process produced a huge amount of very detailed information. Through a process of *coding synthesis* we identified the main *issues* concerning the learning of the group that appeared in the coded transcriptions. Finally, through a process of *coding analysis* we were able to establish the main characteristics of each issue and identify the episodes that were more representative of each characteristic. The structuring of those issues (in terms of the three processes implied by learning as a social practice) and the evidence supporting them enabled us to produce an account of the working of the group as a community of practice.

We found that the group engaged in a permanent search of meaning that generated multiple events of confusion, conflict and discovery. We were able to characterize the mechanisms used for these events. Given that the group had to solve a task in each meeting, these processes of negotiation of meaning always ended in the adoption of some proposals that were reified and registered in the transparencies. This type of participation promoted a mutual engagement with *interdependent learning*, one of the most important features of a community of practice. The emergence of a leader, the teaching

experience of the members, the way tasks were defined and the written commentaries that the trainers made to their work were the most significant factors affecting the working of the group as a community of practice. For instance, although there are references in the transcriptions to what happened in the classroom (interaction with peers, spoken commentaries from the trainers to their presentations, or general statements of the trainers), we found that the commentaries to the transparencies were the most important link between the working of the group and the classroom environment.

COMMUNITIES OF PRACTICE AS A CONCEPTUAL TOOL FOR DESIGNING AND IMPLEMENTING TEACHER TRAINING PROGRAMS

We are not suggesting that all groups established themselves as communities of practice or developed learning processes as those depicted by the group we studied. Some groups organized themselves as teams: the tasks were divided into subtasks, each member taking responsibility for delivering his/her part. The presentations were then built as the summing of the parts. As Anderson and Speck (1998) have shown, when a group organizes itself as a team, there is learning. However, one cannot expect negotiation of meaning and interdependent learning as properties of the learning processes of a team. What was important in the case of the quadratic function group we studied was the mutual engagement of the participants in the search of a joint enterprise that involved the concern for the learning of all the members of the group.

The working of the groups is *one* of the contexts in which learning takes place in our methods course. Preservice teachers, individually and collectively, also learn, for example, during the lessons, while doing individual work, in other courses, and while giving private lessons. However, since teaching takes place during the lessons, one tends naturally to think that most learning happens within that context. This study has shown us that this is not necessarily the case.

Wenger (1998) mentions the risks of romanticizing communities of practice (p. 132). Nevertheless, research on teacher education is giving increasing importance to communities of practice as prominent loci of learning and development in teacher training. For instance, communities of practice can enhance the learning capability of preservice teachers (Wood, 2003, p. 65), develop the awareness of the value of collaboration (Beck & Kosnik, 2001, p. 925), help counterbalance the long apprenticeship preservice teachers have had in transmission pedagogy (p. 945), and encourage the building of professional communities in the future (Lachance & Confrey, 2003, p. 38). If we, as trainers, value the learning that takes place when a group works as a community of practice, how to promote and cultivate such a

setting? Answering this question requires that teachers' trainers, besides taking care of *what* they expect preservice teachers to be able to do and to know, get concerned about *how* preservice teachers learn and *what* kind of *teaching* is coherent with that learning. The design of the training program (in particular, issues as the methodology and the trainers' performance and attitudes) can make a difference in that learning.

Wenger, McDermott & Synder (2002) have suggested some ideas for designing and cultivating communities of practice within organizations. However, here the metaphor with teacher training breaks down. For instance, our course is not an organization in the sense used by Wenger et al., and groups of preservice teachers working together in such a context cannot be "cultivated" into communities of practice, as can employees in a company. Nevertheless, there are some questions that could be taken into account while designing a methods course in which communities of practice and interdependent learning are expected to take place. We have already mentioned how the commentaries to the transparencies induced and guided new processes of negotiation of meaning within the group. The definition of the tasks played a similar role: they were proposed in such a way that there was always a challenge involved, but solving them was not seen as impossible by the groups. The design of the tasks and the commentaries to the groups' work might promote interdependent learning *if the group has already constituted itself as a community of practice*. Otherwise, in a group working like a team, the commentaries to the transparencies and the definition of the tasks are usually interpreted within the working routines already established and do not necessarily contribute to the processes of negotiation of meaning.

Promoting the emergence of communities of practice implies going beyond a concern about what the groups have learned and bringing to the foreground the ways in which groups engage themselves in a joint enterprise of learning for teaching. This means, as it is the case in the "Aalborg PBL model" (Hansen & Jensen, 2004), that trainers should also assume the role of *consultants*. In such a role, we should give more importance to the tutoring processes, and, for instance, we could induce the groups to include their working routines and concerns as part of the discussions in those meetings.

REFERENCES

- Anderson, R. S., & Speck, B. W. (1998). "Oh What a Difference a Team Makes": Why Team Teaching Makes a Difference. *Teaching and teacher education*, 14(7), 671.

- Beck, C., & Kosnik, C. (2001). From cohort to community in a preservice teacher education program. *Teaching and teacher education*, 17(8), 925-948.
- Gómez, P., & Rico, L. (2004, 2004). *Integration of didactical knowledge and mathematical content knowledge in pre-service teacher training*. Paper presented at the Discussion group "The Education of mathematics teachers" of the 10th International Congress on Mathematical Education, Copenhagen.
- Graven, M., & Lerman, S. (2003). Wenger, E. (1998). Communities of practice: Learning, meaning and identity. *Journal of Mathematics Teacher Education*, 6(2), 185-194.
- Hansen, S., & Jensen, L. P. (2004). Supervision and Group Dynamics. In A. Kolmos, F. K. Fink & L. Krogh (Eds.), *The Aalborg PBL Model* (pp. 349-361). Aalborg: Aalborg University Press.
- Krainer, K. (2003). Teams, Communities & Networks. *Journal of Mathematics Teacher Education*, 6(2), 185-194.
- Lachance, A., & Confrey, J. (2003). Interconnecting Content and Community: A Qualitative Study of Secondary Mathematics Teachers. *Journal of Mathematics Teacher Education*, 6(2), 107-137.
- Lerman, S. (2001). A review of research perspectives on mathematics teacher education. In F. L. Lin & T. J. Cooney (Eds.), *Making sense of mathematics teacher education* (pp. 33-52). Dordrecht: Kluwer.
- Stein, M. K., & Brown, C.A. (1997). Teacher learning in a social context: Integrating collaborative and institutional processes with the study of teacher change. In E. Fennema & B. S. Nelson (Eds.), *Mathematics teachers in transition* (pp. 155-191). Hillsdale: Lawrence Erlbaum Associates.
- Wenger, E. (1998). *Communities of practices. Learning, meaning, and identity*. Cambridge: Cambridge University.
- Wenger, E., McDermott, R., & Synder, W. (2002). *Cultivating Communities of Practice*. Boston: Harvard Business School Press.
- Wood, T. (2003). A reaction to the background document: Complexity in mathematics teaching and teacher education. In R. Strässer, G. Brandell & B. Grevholm (Eds.), *Educating for the future. Proceedings of an international symposium on mathematics teacher education* (pp. 63-67). Göteborg: Royal Swedish Academy of Sciences.